FROM "BUILDING CAPACITY" TO "BUILDING ON CAPACITY"
- Towards an international network for capacity building in geo-information science and earth observation -

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ABSTRACT:
Since the founding of ITC in 1950, its capacity building activities through educational programmes, delivered in the Netherlands, have served almost 16,000 mid-career professionals from over 160 countries. In response to changing international conditions and an increased need for flexibility in post-graduate education among its target groups, ITC has continuously upgraded the contents of its educational programme. In addition ITC has also continuously changed its education delivery policy. More recently a new strategy has been initiated, transferring part of the delivery of the educational programmes to the home countries of ITC's clientele through joint educational programmes with qualified partner organisations. In doing so, ITC aims at developing a global international network of educational organizations that accept and accredit each other's education. The network, which currently includes six partner institutions - and countries (besides ITC) with joint programmes conducted partly in these countries and at ITC in the Netherlands is to cover about 20 partners in 2010. One of the main challenges ITC faces with these joint programmes, is to maintain quality standards at the same level as applied in the Netherlands for ITC's regular programme, while simultaneously meeting the national criteria of its partners. From the start of these joint educational programmes onwards, quality assurance measures are incorporated; during the development of the curricula, the training of trainers, establishment of assessment criteria, exchange of lecturing staff and joint assessment during and upon completion of the programmes concerned. The latest stage in these efforts is the establishment of a network of multilateral equi-partnerships called GI-NET. Preliminary assessment has shown that this strategy is, from a financial-economic point of view, more efficient for both the Dutch Government and participants (and those who fund their participation in ITC's programmes).

1. INTRODUCTION

1.1 The ITC mission

ITC was established in 1950 with the primary aim to build capacity in remote sensing techniques and applications for the purpose of economic development of the then still referred to as "developing world".

The main instrument to do so has been through an educational programme that addresses the capacity requirements in technical and conceptual skills and land-related applications.

Achievements to date have been impressive. Since its founding, over 16,000 mid-career professionals from over 160 countries have graduated from ITC.
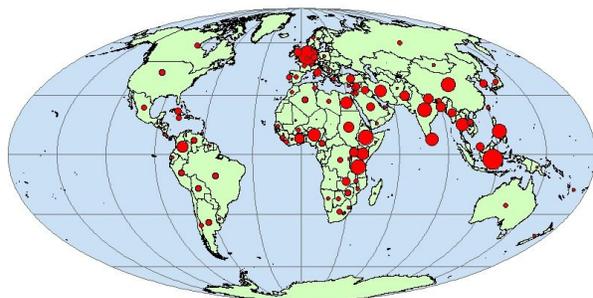
Figure 1 Countries of origin ITC alumni 1950-2003

1.2 Changing instruments

Initially ITC's efforts were directed at individual candidates (with a number of years of professional experience – so-called mid-career professionals). Efforts then gradually shifted to addressing the manpower requirements of entire professional organisations. It became rapidly clear, however, that the demand in terms of capacity requirements would never be met by limiting capacity building efforts to the Netherlands. Strengthening that capacity building capability in the recipient countries themselves then became a major focus of ITC's activities.

A first initiative in this direction took place in India where in 1966 the Indian Photointerpretation Institute (IPI) was founded by the Indian Government with support from ITC (d'Audretsch, F.C., 1973, Sinha, Col. J.N., 1976). This initiative actually originated from the personal contacts between ITC's founding father (and former Dutch Prime Minister) Prof. Dr. W. Schermerhorn and India's former Prime Minister Pt. Jawahar Lal Neru, who during a visit to the Netherlands in 1957 became so impressed with ITC that he decided to start a similar initiative in India. IPI, since renamed as Indian Institute of Remote Sensing (IIRS), is one of the best-known institutes in Asia that caters for the needs of both Indian organisations as well as those of other Asian countries.

Similar initiatives followed in among others Nigeria, Colombia, Indonesia and China to form the ITC sister institutes. By 2000 the network of capacity building institutions associated with ITC one way or another had grown to over 20.

Over the years the demand for ITC's products and services has changed and ITC has changed its capacity building strategy and instruments accordingly. Not only by strengthening capacity building institutions across the world (Section 1.2) but also by adjusting its products and services. Over the years technician and technologist type of programmes were transferred to its sister institutes and replaced by advanced levels to include Master of Science Programmes (as from 1967) and PhD level (as from 1990), supported by capacity building through research and advisory services. Content wise the educational programmes also changed in correspondence with technological developments and changing demand in society.

1.3 A new challenge

Such changes have occurred gradually, over time, enabling ITC to adjust its products and services and the delivery mechanisms accordingly. Since the end of the 1990-s, however, ITC is observing changes in its operating environment that come much more rapid with potentially more dramatic implications for ITC than hitherto experienced. Local capacity has increased, demand is changing, policies with respect to development cooperation (effecting funding) and higher education (affecting the institutional position), changes in society (both economic and technological) all have potentially far reaching implications.

1.4 Structure

This paper first of all defines the term "capacity building" compared to "education" in order to specify the particular mission of ITC. Subsequently the various changes in the operating environment of ITC are dealt with in adequate detail to understand the implications for capacity building by ITC. Chapter 4 elaborates the way ITC has thus far addressed the implications of the current changing environment and the way it intends to do so in future.

2. CAPACITY BUILDING DEFINED

2.1 Capacity building: beyond education

Capacity building aims at improving the ability of entire organisations to perform agreed tasks, either singly or in co-operation with others. *Education*, directed at human resources development, i.e. the supply of technical skills and professional values is only one component of capacity building (Georgiadou, Y. and R. Groot, 2002).

Where a proper organisational and institutional environment is lacking, as is the case in many developing and emerging economies organisational and institutional strengthening form the two major other components of capacity building (Figure 2)

We observe, the world over, a rapidly changing position of public organisations traditionally charged with the production and dissemination of geographical information. Privatisation, cost-recovery drives and competition from an emerging private sector, are just a few of the changes which affect the organisational and institutional capacity requirements of such organisations. These developments require an organisation to avail of human resources that not only have the technological skills and professional values required to address these developments but who are also able to deal with the various management aspects to operate within and contribute to institutional setting and policy issues.

	PURPOSE	FOCUS
CAPACITY BUILDING FOR GEOINFORMATICS	Human resources development	Supply of technical and professional personnel
	Organisational strengthening	Strengthen the management capacity of organisations; institutionalise geo-ICT solutions (systems and processes) as well as strategic management principles
	Institutional strengthening	Strengthen the capacity of organisations to develop & negotiate appropriate mandates and modus operandi as well as appropriate (new) legal and regulatory frameworks

Figure 2. Components of capacity building (Source: Georgiadou, Y. and R. Groot, 2002)

The instruments towards building capacity can clearly not be limited to education or training. Research capabilities will need to be enhanced and advisory services to be provided to complement human resources development.

2.2 Sustainable capacity building

The term "sustainability" generally refers to financial aspects. In other words, it deals with the question whether there will be financial resources to continue the capacity building efforts in future.

There are, at least, two more aspects of sustainability that are important in capacity building, i.e. "scientific" and "institutional" sustainability.

The "scientific sustainability" of a capacity building programme refers to its capability to continuously upgrade its contents in correspondence with the requirements as defined by developments in the environment and society at large. This generally requires such a capacity building programme to be linked to or operate within a research environment.

With "institutional sustainability" is meant the institutional or legal environment in which the capacity building activities take place, or in other words the official mandate and legal position of the organisation. This calls for such efforts to be undertaken by organisations firmly embedded in existing frameworks rather than project-approaches to capacity building involving new and/or temporary institutional frameworks.

3. CHANGING ENVIRONMENT

Although ITC has experienced changes in its operating environment since its founding in 1950 and has adjusted its strategies to fulfil its mission, its current operating environment experiences unprecedented changes

3.1 National capacity

The capacity of national institutions to provide education and training in geo-information science and earth observation is rapidly growing in the countries that have traditionally sent people to ITC. This concerns academic institutions, which provide education at bachelor, master and even PhD level but also vocational education organisations, training branches of professional organisations and private sector institutions that provide short technical training. It seems that international education activities, of which ITC has been one of the contributors, has paid off!

3.2 Demand

Although there is still a considerable demand for degree education, ITC observes distinct changes with an increased demand from its traditional clientele for flexibility in terms of duration, location and delivery mode (distance education in particular). Moreover ITC experiences a distinct increase in the demand for short specific training that could not be met by the traditional delivery modes applied by and at ITC up till some years ago.

3.3 Development cooperation policy

3.3.1 General: Perhaps the most important developments that are due to affect ITC's operations are those part of development cooperation policy, Dutch development cooperation policy in particular (Ministry of Foreign Affairs, 2003). Although education is given priority in the Dutch policy, this is restricted to basic and lower vocational levels, while financial support is provided through the national budgets of the recipient countries.

3.3.2 Funding: This policy has a direct bearing on the funding arrangements for students who want to study in the Netherlands. The Netherlands Fellowship Programme up till 2003 available to ITC will be available under competitive conditions with twice the number of programmes and thrice the number of providing organisations. This implies that possibilities for study at ITC from NFP will most likely be considerably restricted as from 2004.

The Dutch policy differs from that of other donors as well in its drive for untied aid. Most of Dutch aid, which is all in the form of grants, is increasingly provided as untied aid. In other words, recipients are free to spend the aid money in whatever way and country that they consider best. It is not unlikely that in the not so far away future the fellowships provided under the Netherlands fellowship Programme may be used to study in other countries but the Netherlands as well.

3.4 Societal changes

3.4.1 Economic changes: The rapid economic development that takes place in the developing world and emerging nations has an effect on national ability to fund capacity building from national resources, rather than development aid. At the same time a policy is observed that prefers spending national budgets locally rather than abroad, and spread over larger number of persons for shorter training than to a limited few for an academic degree. ITC observes a increased demand for tailor-made capacity building, increasingly so to be organised locally.

3.4.2 Technological changes: The rapid development of ICT has increased the possibilities as well as the demand for distance education. Although many institutions are heavily involved in this new delivery mode, even entire GIS degree courses are based on it, ITC has thus been hesitant to engage massively in distance education. The nature of its educational programmes that are a component of ITC's capacity building efforts, based on concept rather than techniques with intensive group interaction is considered not well suited to that delivery mode. Developments are thus that ITC may well have to adjust its strategy in this respect accordingly.

3.5 Internationalisation of Dutch higher education

For some years now Dutch Higher Education institutes are actively engaged in attracting foreign students. In doing so they are supported by the Dutch Government. The major reasons behind this drive for internationalisation among Dutch Higher Education Institutes, has, apart from being involved in education rather than capacity building, nothing in common with the development-oriented mission of ITC. The main reasons for such institutes to attract foreign students are:
1. Address the under-utilisation of existing capacity: to compensate for falling Dutch student numbers
2. Address the lack of interest among Dutch students to be engaged in PhD research in technical-oriented subjects (e.g. some 50% of the PhD candidates at Twente University, one of the three technical universities in the Netherlands is non-Dutch) and;
3. Address the shortage of academic staff in the technical-oriented subjects.

In other words, where institutes for international education strongly advocate against "brain drain", higher education institutes in the Netherlands, or across the western world for that matter, are more interested in "brain gain".

Moreover, Dutch institutes of higher education that pursue internationalisation are also confronted with major problems, such as language abilities, cultural adjustment problems, different learning styles and expectations, and their tendency to cluster and form groups vis-à-vis Dutch students (Powell, P. and H. Adriaansens, 2004).

3.6 New policies on Higher Education in Europe

3.6.1 Introduction of the Bachelor-Master system

In 1999 the Ministers of Education of European nations signed the Declaration of Bologna, agreeing to introduce, throughout Europe the Anglo-Saxon Bachelor-Master system, replacing the various systems that had thus far been applied in individual countries. The main purpose of doing so was to create an academic-educational landscape that would allow individual students to "shop around" and do part of their study at other institutions than those in their own country.

In the Netherlands the Master of Science degree was not officially recognised up till recently. International education institutes in the Netherlands were allowed a special exception in this respect in allowing the issue of an MSc degree for the international (rather than the Dutch) market.

3.6.2 Accreditation

The introduction of the so-called Ba-Ma system at Dutch universities requires a complete redesign of existing programmes based on the old system. These new programmes have to go through a system of accreditation for which a new organisation has been set-up. This organisation is currently elaborating procedures and criteria for accreditation and aims at having all programmes at Dutch Universities accredited by the end of 2006. The International Education Institutes in the Netherlands, and their academic programmes, will become an integral part of this system and have been given till the end of 2007 to have their programmes accredited.

4. THE CHALLENGE FOR ITC

4.1 Strategic Plan 2001-2004

Anticipating the changing environment as described in Chapter 3 already for some years, ITC embarked on changing its course more drastically than ever in the past. Its educational programmes were adjusted to pay more attention to aspects of context, i.e. information management, institutional setting and policy. A modular system was introduced, with all programmes/specialisations consisting of three weeks modules, all starting at the same time. This system, which includes elective modules, allows course participants to select the topics that best fit their individual professional requirements, while also allowing participation by others not following an entire programme.

The strategy was further enhanced in the framework of ITC's Strategic Plan 2001-2004 (ITC, 2001) by introducing short courses (10 in 2004 and 34 in 2005!) and distance education.

Another important element is the embedding into the Dutch system of Higher Education by enhancing the collaboration with ITC's partner universities in the Netherlands, i.e. Universities of Twente, Utrecht, Wageningen and Delft and having the ITC programmes accredited under the national applicable system in the Netherlands (Section 3.6).

4.2 Capacity building at ITC

Capacity building at ITC has over the years developed from human resources development directed at technological knowledge and skills to gradually incorporate organisational (information management) and institutional strengthening capabilities. The educational programmes at ITC address the various requirements resulting from technological developments (specifying the steps in the process from data acquisition to information dissemination) and the context (specifying information management, institutional setting and policy issues). Each of ITC's programmes concentrates in different ways on any of the process and context elements, geared to the specific human resource requirements of target organisations (Molenaar, M. and M-J. Kraak 2002).

Context	Data acquisition	Storage & retrieval	Processing & presentation	Dissemination & use
Application domain				
Technology				
Information management				
Inst. setting & policy				

Figure 3 The processes and context of geo-information (Molenaar, M. & M.J. Kraak 2002)

These human resources development activities through a specific educational and training programme have been complemented with joint research activities and advisory services.

The distinction between universities and international education institutes such as ITC boils down that for the former, education is the goal, whereas for the latter education is a tool towards building capacity.

4.3 Joint Educational Partnerships

4.3.1 The principle defined: A major strategy component of the Strategic Plan 2001-2004 is the decentralisation of (parts) of ITC's educational programmes to and in collaboration with qualified partner organisations in other countries. In response to remarks by partner organisations the term "decentralisation" has since been replaced by "joint education". This implies a major shift from "building capacity" to "building on the capacity" that has been built over the past decades.

These joint educational programmes address the increasing demand for flexibility and are reckoned to be more cost efficient and effective. Partnerships are based on:

- *Principle*: requiring partners to agree to the principle of equal partnerships, i.e. collaboration not based on donor-recipient relation but on shared responsibility;
- *Market opportunities*; requiring a well-defined market for the type and specialisation of the programme offered;
- *South-to-south relationships*; requiring partners to enter into collaboration and/or offer their services also to organisations and individuals outside their own geographical location;
- *Institutional and legal aspects*; requiring partners to be eligible in their country/region to organise joint educational programmes and to issue academic degrees;
- *Capacity and capability*; requiring both partners, incl. ITC to have the capacity and capability to assume responsibility for carrying out the respective parts of the educational programme; and
- *Funding*; requiring agreement on both sides that in principle partners will be jointly responsible to fund the joint programmes from their own (subsidy) resources and external fellowships. In principle there will be no transfer of funds between partner organisations.

Although principally partners are responsible to ensure funding of their own part of activities, successful, sustainable partnerships will require a considerable investment in time and money. It is foreseen that both ITC and potential partners may not avail of sufficient own resources to cover the initial investment expenses involved. For that purpose additional external project funding will have to be pursued.

At this moment there are six joint programmes operational in Iran, Bolivia, India, China, Philippines and Egypt. Similar programmes are being developed in Tanzania, Nigeria, Ghana and South Africa.
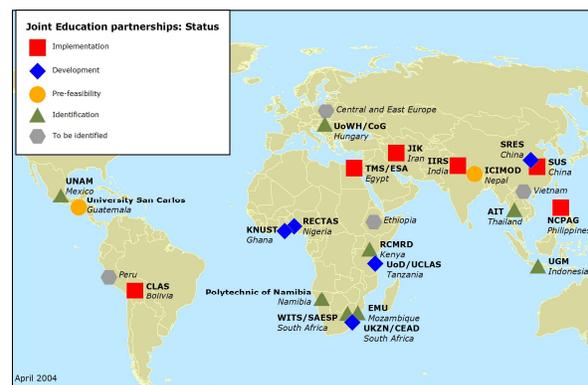
Figure 3. ITC Joint Education Partnerships (April 2004)

These joint programmes are not limited to exchanging students, allowing them to do part of their study in their home country and part at ITC in The Netherlands. It also involves the exchange of staff for quality assurance purposes, not only ITC staff visiting partner organisations but also the other way around, with staff of partner organisations to supervise students while studying at ITC. Moreover joint research and advisory services complement the human resources development activities.

4.3.2   Modalities of collaboration: Joint educational programmes do not follow one fixed modality. Capabilities of the partners, financial conditions as well as legal aspects may play a role.

In the largest effort thus far with the KN Toosi University and Soil Conservation and Watershed Research Institute in Tehran, Iran the Professional Master course took place entirely in Iran. For the Master of Science course, all course work took place done in Tehran, while the research and thesis writing, including final examination was done at ITC in the Netherlands.

The procedures for obtaining visa for long term stay in the Netherlands for course participants from India may take almost up to one year. For that reason (as well as the capacity of national staff to guide MSc candidates in their research), candidates of the joint programme with the Indian Institute of Remote Sensing limit their stay in the Netherlands to the final three months of their thesis writing and defence.

4.3.3   Quality assurance: The real challenge in joint educational programmes appears to be quality assurance. Both partners have to apply quality standards to fulfil accreditation requirements applicable to each of them separately as well as jointly in each country. Although in the early stages of "decentralisation" ITC criteria were considered as point of departure, it became quickly clear that partner organisations are bound by official regulations as well.

Quality assurance of joint educational programmes is pursued in three ways:
1. *Organisation* of the collaboration: directed at creating equal quality of the programmes offered by the partners:
2. *Management* of the collaboration: directed at ensuring efficient and effective quality control; and
3. *Quality assurance instruments*: both during the preparation, implementation and consolidation phase.
(Beerens, S.J.J. and I. ten Dam, 2002)

The <u>organisation of collaboration</u> for a joint educational programme goes through three phases:
a) identification, pre-feasibility assessment and selection on the basis of the criteria listed in Section 4.3.1;
b) formulation and design, elaborating above mentioned criteria in more detail; and
c) implementation and consolidation, including an extensive training of trainers programme.

At the end of each phase partners explicitly decide whether or not to proceed with the collaboration.

The <u>management of joint educational programmes</u> pays specific attention to simultaneously address the requirements both partners have to comply with according to national accreditation regulations.

A series of <u>quality control instruments</u> have been put in place for joint educational programmes:
- *Training of Trainers*: A ToT programme is initiated in the earliest possible stage of the collaboration. The aim is to provide the partner organisation with adequate capacity and capability to ensure quality education (including the capacity to replace teaching staff if events so require).
- *Joint assessment of module performance*: The teaching staff of the partner organisation and the teaching staff of the respective subject at ITC jointly develop the examinations and assess the performance of individual course participants.
- *Joint final assessment (of assignments, theses):* Since both partner organisations issue a degree, both are jointly responsible for the final assessment, by involving representatives of both partners in the final examination.
- *Joint quality review of the programme*: The entire programme will be reviewed by the two partners on an annual basis, using the results of individual subject evaluations, the end-of-programme evaluation, assessment results of the course participants, and the opinions of teaching staff of both partners.
- *Independent review*: Every three years, both partner organisations arrange for a review by independent specialists (at least one external specialist in the programme field and an education specialist).
- *External review/accreditation*: Partners will be obliged by national laws to have their programmes accredited according to criteria and procedures that differ from country to country.

One instrument introduced to control quality of the joint educational programmes deserves special mention, i.e. *internet-based remote support.* Recently, and initially as a by-product of the development of distance education programmes, an internet-based education platform called Blackboard© has been introduced. This platform has various functions, including presenting lecture materials and conducting exercises, as well as chat and discussion board facilities.

Although the introduction of this internet-based support is occasionally being confronted with technical limitations, it allows supervising staff from both the partner organisation and ITC, thousands of kilometres apart, to co-teach at a distance and monitor the quality of the teaching. It simultaneously allows the individualisation of the support to course participants – a requirement when dealing with mid-career professionals from a variety of backgrounds and with a wide range of experience.

4.3.4   Sustainable partnerships in capacity building: In terms of "financial sustainability" one of the basic principles of the joint education initiative of ITC relates to the requirement that partners will each arrange funding of their own share in the activities from their own regular resources as applied in their home countries. The student-related expenses are jointly pursued from a variety of fellowship- and scholarship programmes.

In building capacity in the recipient countries since the mid-1960-s ITC was confronted with the problem of "scientific sustainability" of the various programmes. Although an adequate capacity was built to delivering in particular the human resources component, an inherent capacity to continuously adjust these programmes to technological changes in the knowledge field and demand was lacking. This became

clear by the repeated need for upgrading through project intervention and support. The major reasons for this phenomenon were a lack of research (culture) on which programmes were based in combination with a lack of resources and communication means for national staff to keep up to date with developments world-wide in their knowledge field.

In the process of building educational capacity in the recipient countries as described in sections 1.2, ITC has increasingly changed its attention from (the training branches of) professional organisations to academic institutions, university faculties in particular. This shift was due to the recognition of the fact that "institutional sustainability" is of paramount importance.

At the same time, however, ITC itself has also developed a position of enhancing scientific sustainability by embedding its research programme in an international environment and by enhancing its collaboration network with professional organisations to keep its relation with "society at large"

4.4 Certification

Since the decision by the European ministers of education at the Declaration of Bologna in 1999 to introduce the Bachelor-Master system throughout Europe, procedures and criteria are being developed for the accreditation of the programmes under the new system (Section 3.6). Accreditation of programmes determines not only official recognition by law of the degree but also the funding of these programmes by the Dutch Ministry of Education.

Procedures and criteria of accreditation are still in the process of development. They are as yet unclear for programmes that are entirely delivered in the Netherlands, while conditions for joint programmes seem to be even less clear.

To address the uncertain policy with respect to accreditation and the potential risk that "off-shore" joint programmes may have on the accreditation (and hence financing) of those programmes entirely organised in the Netherlands, ITC now considers to certify those components of joint programmes delivered by partner organisations and accept the credits accumulated by those partners.

This certification may also allow expanding the collaboration to other partners that have their own ongoing programmes, without having a major requirement on ITC resources in terms of development and quality assurance.

4.5 From bilateral to multilateral relationships: GI-NET

Up till now ITC's joint educational programmes were based on bilateral relations between ITC and individual partners. In a workshop organised at ITC in December 2003, attended by 27 representatives of 17 partner institutes on joint educational programmes, it was concluded that partnerships should be transferred from dependent bilateral relationships, where ITC acted as provider and engine to bilateral equi-partnerships, where knowledge and experience are exchanged between partners through education, research and advisory services and finally to multilateral equi-partnerships. The aim of the workshop was to find common ground for developing an international network of university-level human resources development programmes on geo-information science and earth observation in which partners each contribute from their own

strength. The position of ITC in this network, although initially a central node in the network will gradually change to a node of equal importance compared to other partners. Eventually at this workshop, common ground was found and a name for the network accepted, i.e. called GI-NET, Geo-Information Network for Education and Training. (Source ITC, 2004).

5. CONCLUSIONS

Joint educational programmes address the increasing demand for flexibility in academic degree programmes and respond to the need for more demand-driven and tailor-made training. Moreover they turn out to be much more cost efficient and effective. Calculations by ITC for its programmes have revealed that from the perspective of the individual course participant (or sponsor) joint programmes (at the same quality level as full programmes at ITC) may be up to 65% cheaper. From the perspective of the Dutch Government as a development cooperation donor, joint educational programmes may be up to even 75% cheaper compared to having them done entirely in the Netherlands.

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